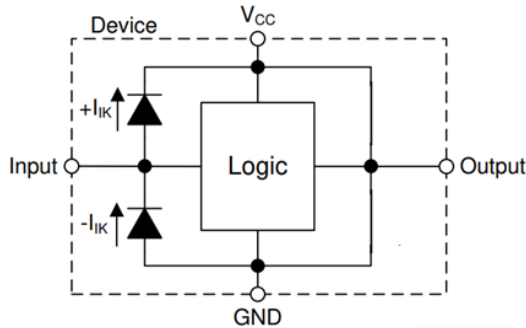
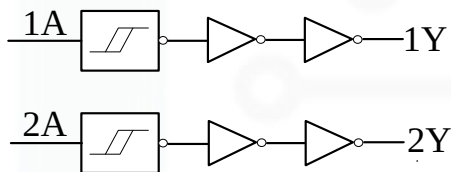


### FEATURES

- Operating Voltage Range: 1.65V to 5.5V
- Low Power Consumption: 1μA (Max)
- Operating Temperature Range: -40°C to +125°C
- Inputs Accept Voltage to 5.5V
- High Output Drive: ±24mA at  $V_{CC}=3.0V$
- Micro Size Packages: SC70-6
- Positive-negative input clamp diode
- 



### LOGIC SYMBOL



### DESCRIPTION

The GS2G14 contains two independent inverters each with Schmitt trigger input. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. The GS2G14 is designed for 1.65V to 5.5V VCC operation. The device performs the Boolean function  $Y = \bar{A}$ .

Inputs can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment. Schmitt trigger action at the inputs makes the circuit tolerant of slower input rise and fall times.

This device is fully specified for partial power-down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

### APPLICATIONS

- Home Theaters
- Blu-ray Players and Home Theaters
- Desktops or Notebook PCs
- Digital Video Cameras (DVC)
- Mobile Phones
- Personal Navigation Device (GPS)
- Portable Media Player

### FUNCTION TABLE

| INPUTS | OUTPUT |
|--------|--------|
| nA     | nY     |
| L      | H      |
| H      | L      |

$$Y = \bar{A}$$

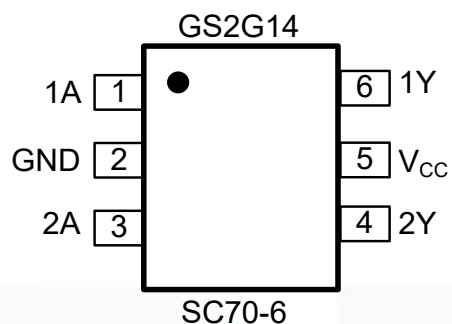
H = High Voltage Level

L = Low Voltage Level

### PACKAGE/ORDERING INFORMATION

| PRODUCT | ORDER NUMBER | PACKAGE DESCRIPTION | PACKAGE OPTION      | MARKING INFORMATION |
|---------|--------------|---------------------|---------------------|---------------------|
| GS2G14  | GS2G14-CR    | SC70-6              | Tape and Reel, 3000 | 2G14                |

## PIN CONFIGURATIONS



## PIN DESCRIPTION

| PIN | NAME            | FUNCTION       |
|-----|-----------------|----------------|
| 1、3 | 1A、2A           | Date Inputs    |
| 2   | GND             | Ground         |
| 4、6 | 2Y、1Y           | Date Outputs   |
| 5   | V <sub>CC</sub> | Supply Voltage |

## Specifications

### Absolute Maximum Ratings <sup>(1)</sup>

|                  |                                                      |                                                         | MIN  | MAX                  | UNIT |
|------------------|------------------------------------------------------|---------------------------------------------------------|------|----------------------|------|
| V <sub>CC</sub>  | Supply voltage range                                 |                                                         | -0.5 | 6.5                  | V    |
| V <sub>I</sub>   | Input voltage range <sup>(2)</sup>                   |                                                         | -0.5 | 6.5                  | V    |
| V <sub>O</sub>   | Power-Down Mode, V <sub>CC</sub> = 0V <sup>(2)</sup> |                                                         | -0.5 | 6.5                  | V    |
| V <sub>O</sub>   | Active Mode <sup>(2)</sup>                           |                                                         | -0.5 | V <sub>CC</sub> +0.5 | V    |
| I <sub>IK</sub>  | Input clamp current                                  | V <sub>I</sub> < 0V                                     |      | -50                  | mA   |
| I <sub>OK</sub>  | Output clamp current                                 | V <sub>O</sub> > V <sub>CC</sub> or V <sub>O</sub> < 0V |      | ± 50                 | mA   |
| I <sub>O</sub>   | Output current                                       | V <sub>O</sub> = 0V to V <sub>CC</sub>                  |      | ±50                  | mA   |
| I <sub>CC</sub>  | Supply Current                                       |                                                         |      | +100                 | mA   |
| I <sub>GND</sub> | Ground Current                                       |                                                         |      | -100                 | mA   |
| T <sub>J</sub>   | Junction temperature                                 |                                                         |      | 150                  | °C   |
| T <sub>stg</sub> | Storage temperature                                  |                                                         | -65  | 150                  | °C   |
| T <sub>L</sub>   | Lead Temperature (Soldering,10s)                     |                                                         |      | 260                  | °C   |

(1) Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(3) The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

### ESD Ratings:

| PARAMETER               | SYMBOL |                           | MAX   | UNIT |
|-------------------------|--------|---------------------------|-------|------|
| Electrostatic discharge | IESD   | Latch up current          | 350   | mA   |
|                         | VESD   | Human-body model (HBM)    | ±5500 | V    |
|                         |        | Charge device model (CDM) | ±2000 |      |



### ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

### Thermal Information:

| THERMAL METRIC        |                                              | GS2G14 | UNIT |
|-----------------------|----------------------------------------------|--------|------|
|                       |                                              | SC70-6 |      |
| R <sub>ΘJA</sub>      | Junction-to-ambient thermal resistance       | 214.7  | °C/W |
| R <sub>ΘJC(top)</sub> | Junction-to-case(top) thermal resistance     | 126.1  | °C/W |
| R <sub>ΘJB</sub>      | Junction-to-board thermal resistance         | 59.0   | °C/W |
| Ψ <sub>JT</sub>       | Junction-to-top characterization parameter   | 31.4   | °C/W |
| Ψ <sub>JB</sub>       | Junction-to-board characterization parameter | 56.4   | °C/W |
| R <sub>ΘJC(bot)</sub> | Junction-to-case(bottom) thermal resistance  | N/A    | °C/W |

## ELECTRICAL CHARACTERISTICS

over recommended operating free-air temperature range (TYP values are at  $T_A = +25^{\circ}\text{C}$ , unless otherwise noted.) <sup>(1)</sup>

### Recommended Operating Conditions

| PARAMETER                     | SYMBOL     | TEST CONDITIONS                                                    | MIN                  | MAX                 | UNITS              |
|-------------------------------|------------|--------------------------------------------------------------------|----------------------|---------------------|--------------------|
| Supply voltage                | $V_{CC}$   | Operating                                                          | 1.65                 | 5.5                 | V                  |
|                               |            | Data retention only                                                | 1.5                  | 5.5                 |                    |
| High-level input voltage      | $V_{IH}$   | $V_{CC}=1.65\text{V to }1.95\text{V}$                              | $0.5 \times V_{CC}$  |                     | V                  |
|                               |            | $V_{CC}=2.3\text{V to }2.7\text{V}$                                | 1.1                  |                     |                    |
|                               |            | $V_{CC}=3\text{V to }3.6\text{V}$                                  | 1.5                  |                     |                    |
|                               |            | $V_{CC}=4.5\text{V to }5.5\text{V}$                                | $0.45 \times V_{CC}$ |                     |                    |
| Low-level input voltage       | $V_{IL}$   | $V_{CC}=1.65\text{V to }1.95\text{V}$                              |                      | $0.3 \times V_{CC}$ | V                  |
|                               |            | $V_{CC}=2.3\text{V to }2.7\text{V}$                                |                      | 0.55                |                    |
|                               |            | $V_{CC}=3\text{V to }3.6\text{V}$                                  |                      | 0.75                |                    |
|                               |            | $V_{CC}=4.5\text{V to }5.5\text{V}$                                |                      | $0.2 \times V_{CC}$ |                    |
| Input voltage                 | $V_I$      |                                                                    | 0                    | 5.5                 | V                  |
| Output voltage                | $V_O$      |                                                                    | 0                    | $V_{CC}$            | V                  |
| Input transition rise or fall | $t_r, t_f$ | $V_{CC}=1.8\text{V} \pm 0.15\text{V}, 2.5\text{V} \pm 0.2\text{V}$ |                      | 20                  | ns/V               |
|                               |            | $V_{CC}=3.3\text{V} \pm 0.3\text{V}$                               |                      | 10                  |                    |
|                               |            | $V_{CC}=5\text{V} \pm 0.5\text{V}$                                 |                      | 5                   |                    |
| Operating temperature         | $T_A$      |                                                                    | -40                  | +125                | $^{\circ}\text{C}$ |

### DC Characteristics

| PARAMETER        |               | TEST CONDITIONS                                                            | V <sub>CC</sub> | TEMP  | MIN                  | TYP  | MAX  | UNITS |
|------------------|---------------|----------------------------------------------------------------------------|-----------------|-------|----------------------|------|------|-------|
| V <sub>OH</sub>  |               | I <sub>OH</sub> = −100μA                                                   | 1.65V to 5.5V   | Full  | V <sub>CC</sub> -0.1 |      |      | V     |
|                  |               | I <sub>OH</sub> = −4mA                                                     | 1.65V           |       | 1.2                  |      |      |       |
|                  |               | I <sub>OH</sub> = −8mA                                                     | 2.3V            |       | 1.7                  |      |      |       |
|                  |               | I <sub>OH</sub> = −16mA                                                    | 3V              |       | 2.2                  |      |      |       |
|                  |               | I <sub>OH</sub> = −24mA                                                    |                 |       | 2.1                  |      |      |       |
|                  |               | I <sub>OH</sub> = −32mA                                                    | 4.5V            |       | 3.6                  |      |      |       |
| V <sub>OL</sub>  |               | I <sub>OL</sub> = 100μA                                                    | 1.65V to 5.5V   | Full  |                      |      | 0.1  | V     |
|                  |               | I <sub>OL</sub> = 4mA                                                      | 1.65V           |       |                      |      | 0.15 |       |
|                  |               | I <sub>OL</sub> = 8mA                                                      | 2.3V            |       |                      |      | 0.25 |       |
|                  |               | I <sub>OL</sub> = 16mA                                                     | 3V              |       |                      |      | 0.25 |       |
|                  |               | I <sub>OL</sub> = 24mA                                                     |                 |       |                      |      | 0.35 |       |
|                  |               | I <sub>OL</sub> = 32mA                                                     | 4.5V            |       |                      |      | 0.35 |       |
| I <sub>I</sub>   | A or B inputs | V <sub>I</sub> =5.5V or GND                                                | 5.5V            | +25 C |                      | ±0.1 | ±1   | μA    |
|                  |               |                                                                            |                 | Full  |                      |      | ±5   |       |
| I <sub>off</sub> |               | V <sub>O</sub> =5.5V                                                       | 0               | +25 C |                      | ±0.1 | ±1   | μA    |
|                  |               |                                                                            |                 | Full  |                      |      | ±10  |       |
| I <sub>CC</sub>  |               | V <sub>I</sub> =V <sub>CC</sub> or GND, I <sub>O</sub> =0                  | 1.65V to 5.5V   | +25 C |                      | 0.1  | 1    | μA    |
|                  |               |                                                                            |                 | Full  |                      |      | 10   |       |
| ΔI <sub>CC</sub> |               | One input at V <sub>CC</sub> -0.6V, Other inputs at V <sub>CC</sub> or GND | 3V to 5.5V      | Full  |                      |      | 500  | μA    |

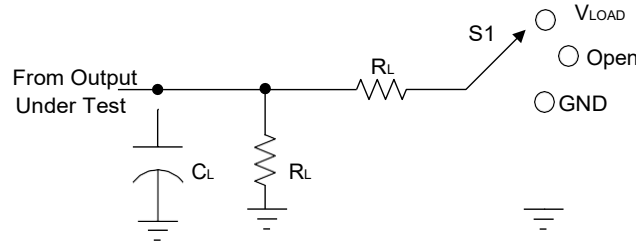
## AC Characteristics

| PARAMETER                     | SYMBOL   | TEST CONDITIONS       |                           | MIN | TYP | MAX | UNITS |
|-------------------------------|----------|-----------------------|---------------------------|-----|-----|-----|-------|
| Propagation Delay             | $t_{pd}$ | $V_{CC}=1.8V\pm0.15V$ | $C_L=30pF, R_L=1k\Omega$  |     | 8.8 |     | ns    |
|                               |          | $V_{CC}=2.5V\pm0.2V$  | $C_L=30pF, R_L=500\Omega$ |     | 5   |     |       |
|                               |          | $V_{CC}=3.3V\pm0.3V$  | $C_L=50pF, R_L=500\Omega$ |     | 3.8 |     |       |
|                               |          | $V_{CC}=5V\pm0.5V$    | $C_L=50pF, R_L=500\Omega$ |     | 3.5 |     |       |
| Input Capacitance             | $C_i$    | $V_{CC}=0V$           |                           |     | 4   |     | pF    |
| Power dissipation capacitance | $C_{pd}$ | $V_{CC}=3.3V$         | $f=10MHz$                 |     | 26  |     | pF    |
|                               |          | $V_{CC}=5V$           |                           |     | 31  |     |       |

(1) All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation.

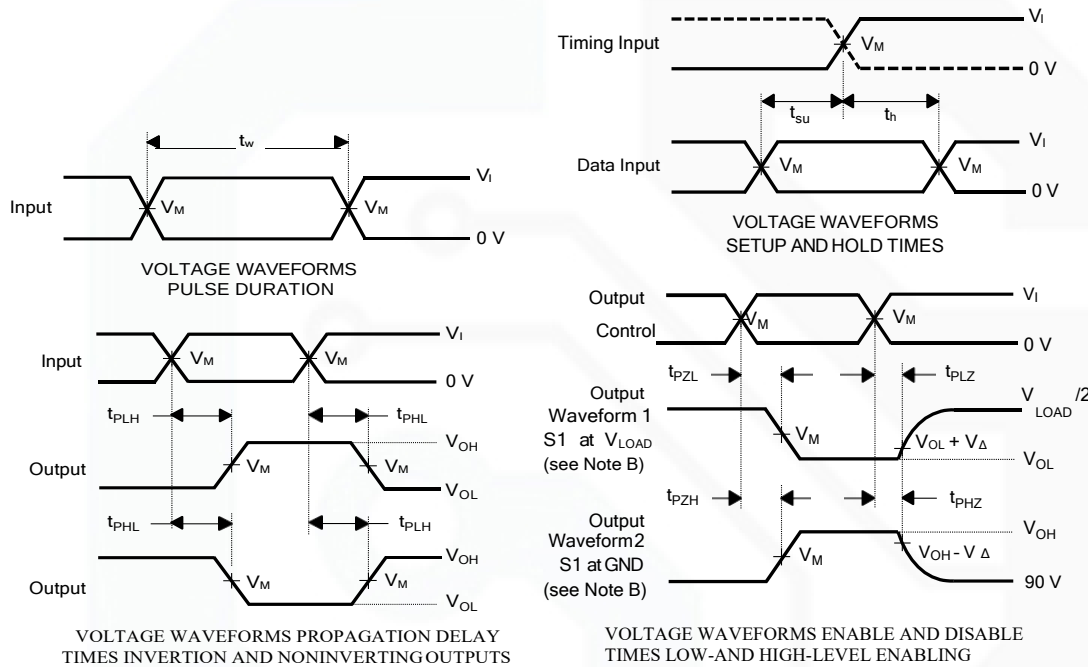


## Parameter Measurement Information



| TEST              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

| $V_{CC}$         | INPUTS   |              | $V_M$      | $V_{LOAD}$        | $C_L$ |      | $R_L$       |              | $V_{\Delta}$ |
|------------------|----------|--------------|------------|-------------------|-------|------|-------------|--------------|--------------|
|                  | $V_I$    | $t_r/t_f$    |            |                   |       |      |             |              |              |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 15pF  | 30pF | 1M $\Omega$ | 1k $\Omega$  | 0.15V        |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 15pF  | 30pF | 1M $\Omega$ | 500 $\Omega$ | 0.15V        |
| $3.3V \pm 0.3V$  | 3V       | $\leq 2.5ns$ | 1.5V       | 6V                | 15pF  | 50pF | 1M $\Omega$ | 500 $\Omega$ | 0.3V         |
| $5V \pm 0.5V$    | $V_{CC}$ | $\leq 2.5ns$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 15pF  | 50pF | 1M $\Omega$ | 500 $\Omega$ | 0.3V         |



**Figure 1. Load Circuit and Voltage Waveforms**

Notes: A.  $C_L$  includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50\Omega$ .

D. The outputs are measured one at a time, with one transition per measurement.

E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .

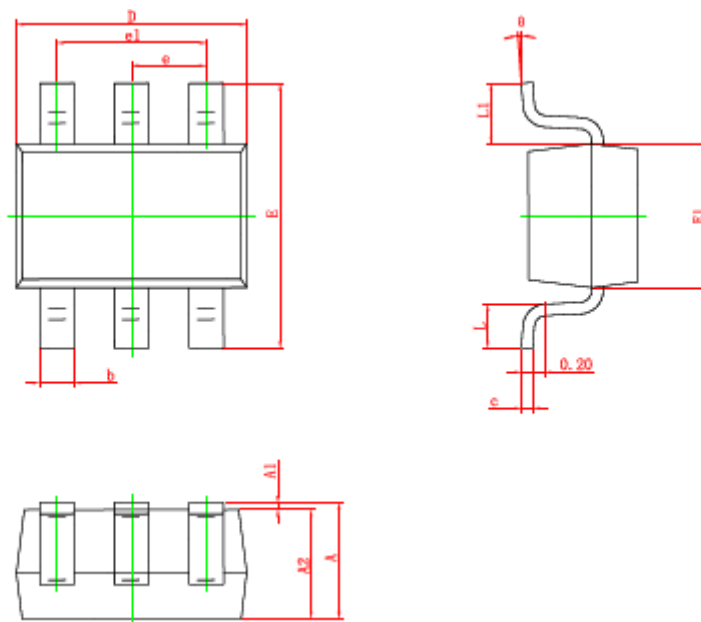
F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .

G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

H. All parameters and waveforms are not applicable to all devices.

## PACKAGE Information

### SC70-6



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.900                     | 1.100 | 0.035                | 0.043 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.000 | 0.035                | 0.039 |
| b      | 0.150                     | 0.350 | 0.006                | 0.014 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.000                     | 2.200 | 0.079                | 0.087 |
| E      | 2.150                     | 2.450 | 0.085                | 0.096 |
| E1     | 1.150                     | 1.350 | 0.045                | 0.053 |
| e      | 0.650 TYP.                |       | 0.026 TYP.           |       |
| e1     | 1.200                     | 1.400 | 0.047                | 0.055 |
| L      | 0.260                     | 0.460 | 0.010                | 0.018 |
| L1     | 0.525 REF.                |       | 0.021 REF.           |       |
| θ      | 0°                        | 8°    | 0°                   | 8°    |